REMARKS

There are 27 claims in the Application.

Claims 17 – 27 have been withdrawn.

Claims 6 – 15 are objected to.

Claims 1 – 5 stand rejected under 35 U.S.C. §§ 101 and 112, first paragraph. Claim 3 is also rejected under 35 U.S.C. § 112, second paragraph.

Claim 16 has been allowed.

Claims 6-8 have been canceled as the limitations of these claims are now found in amended claims 1-3.

The Claims and the Specification are amended herein to more clearly define the invention claimed. No new matter has been added.

The paragraph numbering system as used in the April 7, 2006 Office Action is used here to help clearly communicate the Applicants' remarks.

1 – 6. Applicants acknowledge the restriction requirement and hereby confirm election of Group I, claims 1 – 16. Applicants withdraw claims 17 – 27, without prejudice, and retain the right to rejoin upon the allowance of the instant claims. Neither, the withdrawal of the non-elected claims nor the amendments made herein change the inventorship of the instant application. Examination of these claims is kindly requested.

7. Applicants thank the Examiner for reviewing and accepting the Declaration of Biological Deposit.

8. The Examiner has objected to claims 6 – 15 as being improper for being multiply dependent on one or more claims that are also multiply dependant. This oversight has been corrected by amendment herein.

Claim Rejections – 35 U.S.C. § 101

9 – 10. Claims 1 and 2, therefore their dependent claims 3 – 5, have been amended to particularly point out that the claimed matter is created by man. As suggested by the Examiner the phrase, "An isolated carotenoid overproducing bacteria", has been inserted into the preamble of the claims. It is now clear that the claimed subject matter is not natural, but rather effected by the hand of man. Claims 1 – 5 are in compliance with 35 U.S.C. § 101.

Claim Rejections – 35 U.S.C. § 112, 2nd Paragraph

11 – 12. The Examiner has rejected Claim 3 under 35 U.S.C. § 112, 2nd paragraph for being indefinite. Applicants have hereby amended the claim to remove the text after the end of the sentence which was inadvertently placed. Claim 3 is in compliance with the requirements of 35 U.S.C. § 112, 2nd paragraph.

Claim Rejections – 35 U.S.C. § 112, 1st Paragraph

13 – 14. The Examiner has rejected claims 1 – 5 under 35 U.S.C. § 112, 1st paragraph for failing to comply with the written description requirement. It is the examiner's view that the claims are genus claims comprising carotenoid overproducing bacteria having functional carotenoid enzymatic carotenoid pathways. The pathways are highly variable and the specification does not define any properties (structural features of nucleic acid sequences, sources of the genes,) that would put the skilled person on notice that the inventor was in possession of the invention as claimed. Applicants respectfully traverse.

The claims have been amended to recite the limitation that *E. coli* is the background for the overproducing cell. *E. coli* is well described in the examples and throughout the specification. Additionally, the source of the *dxs, idi, ygbBP, yjeR, ispB, lytB,* and *dxr* are now limited to either *E. coli* or *Methylomonas* , which are also fully described in the examples.

The genes encoding the carotenoid biosynthetic pathway are fully described in the specification and numerous examples of species of each gene is described in Table 1, page 20. Additionally the function of each gene is described in detail in the foregoing discussion entitled "Genes Involved in Carotenoid Production", beginning on page 17. Thus the specification provides, a selection of species for each genus of gene in the pathway, has provided a functional description of each gene and has pointed the skilled person to a number of specific sequences with structural features for each gene and thus has put the skilled person on notice that the inventor was in possession of the invention.

In view of the foregoing Applicants submit that the claims as amended comply with the written description requirement and respectfully request withdrawal of this rejection under 35 USC § 112, 1st paragraph.

15. The Examiner has rejected claims 1 – 5 under 35 U.S.C. § 112, 1st paragraph for lack of enablement. It is the examiner's view that the specification is enabling for *E. coli* transformed with the specific SEQ ID NO:'s addressed in the examples that it is not enabling for the scope of the claims as filed.

As has been noted above the claims have been amended to recite the limitation that *E. coli* is the background for the overproducing cell and the source of the *dxs, idi, ygbBP, yjeR, ispB, lytB,* and *dxr* are now limited to either *E. coli* or *Methylomonas*.

The touchstone of the enablement requirement is whether the skilled person can make and use the invention without undue experimentation *In re Wands*, 858 F.2d at 737, 8 USPQ2d at 1404 (Fed. Cir. 1988). See also *United States v. Telectronics, Inc.* , 857 F.2d 778, 785, 8 USPQ2d 1217, 1223 (Fed. Cir. 1988). Applicants submit that the skilled person, in possession of the present application describing specific *E. coli* and Methylomonas *dxs, idi, ygbBP, yjeR, ispB, lytB,* and *dxr* genes, in conjunction with well known protocols of molecular biology [Sambrook, J., Fritsch, E. F. and Maniatis, T. Molecular Cloning: A Laboratory Manual; Cold Spring Harbor Laboratory Press: Cold Spring Harbor, (1989) (Maniatis) and by T. J. Silhavy, M. L. Bennan, and L. W. Enquist, Experiments with Gene Fusions, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY (1984) and by Ausubel, F. M. et al., Current Protocols in Molecular Biology, pub. by Greene Publishing Assoc. and Wiley-Interscience (1987).; page 44 of the specification], would have no difficulty in practicing the invention as now claimed without undue experimentation.

With respect to the Wands factors:

> (a) the quantity of experimentation necessary, (b) the amount of direction or guidance presented, (c) the presence or absence of working example, (d) the nature of invention, (e) the state of prior art, (f) the relative skill of those in the art, (g) the predictability or unpredictability of the art, and (h) the breath of the claim;

Applicants assert the following:

Factor (a), Applicants assert that the amount of experimentation needed to practice the invention is reasonable and commensurate with the art. Factor (b), the Specification provides description of various methods to overexpress and down regulate a given gene, *see* pages 29 – 39. Advantages and disadvantages are also discussed. One skilled in the arts ought to be familiar with these methods and able to chose the best method for a give host cell. Factor (c), Applicants have provided a biological deposit and thorough description of two working models. Factor (d), the invention is one of gene regulation in bacterial cells. Such art requires some experimentation for even routine techniques. Therefore, one skilled in the art would expect some experimentation, screening, and trial and error to implement the present invention into a host or configuration outside the working examples. However, the information presented in the instant application is sufficient to enable one skilled in the art to implement the regulation pattern to practice the invention. Factor (e), as stated in the background of the invention (*see* page 1 of the Specification, 5th paragraph) the caroteniod

pigment biosynthesis is a extremely well know pathway. As yet, the production of caroteniods is vastly inferior to the present invention (30 – fold less). Therefore, this invention represents a major step forward in caroteniod production not just simply a trick for a specific host. Factor (f), as stated above this invention related to the biotechnical art in an extremely well known pathway, the skill level of the artisan is very high. The skilled artisan is therefore very familiar with the pathway and well versed in many methods and techniques of gene manipulation. Factor (g), the biotechnical art is an unpredictable art, it is not reasonable for an applicant to provide a cookbook recipe of how to practice the invention. Rather, Applicants have depended on the skill and experience of the artisan to implement the invention into the host of their choosing. It is expected that the artisan would be aware of successful methods of gene regulation and be capable of implement the described regulation on the named genes in the host they choose to use. Lastly factor (h), the breath of the claim is reasonable given the vast improvement and the ability of skilled artisans to implement the invention into the host that they are familiar with. It would be unfair to the Applicants to limit their invention to the working example as the Specification has provided enough description to allow others in the art to use the present invention in nearly any bacteria host they are familiar with.

In view of the foregoing, Applicants respectfully request reconsideration of the claims as amended and withdrawal of this rejection under 35 USC § 112, 1st paragraph.

Allowed material

16. Applicants thank the Examiner for allowing claim 16.

Respectfully submitted,

S. NEIL FELTHAM
ATTORNEY FOR APPLICANTS
Registration No.: 36,506
Telephone: (302) 992-6460
Facsimile: (302) 992-5374

Dated: July 12, 2006